ings fund has now reached a sum that will suffice for the erection of the arts and administrative portions, and this will enable the present college buildings (formerly the Penrhyn Arms Hotel) to be handed over entirely to the requirements of science. Thus, for a time, the college will be conducted on the lines of certain foreign universities, where the faculties of arts, science, law, and medicine are housed in separate buildings. It is hoped, however, that the completion of the new college by the erection of buildings for the faculty of science will not be long delayed. A considerable moral obligation rests on the Government to assist in this matter, more especially in view of the fact that the death duties arising out of the estate of the late Lord Penrhyn, while representing a heavy financial loss to the people of North Wales, would far more than suffice to build and equip the new college.

SOCIETIES AND ACADEMIES.

London.

Royal Society, May 23.—"Chemical Reaction between Salts in the Solid State." By E. P. **Perman.** Communicated by Principal E. H. Griffiths, F.R.S.

Experiments have been made on the following pairs of salts:—lead chloride and potassium iodide, mercuric chloride and potassium iodide, sodium carbonate and barium sulphate, sodium sulphate and barium carbonate. The chief points investigated were the effect on certain of these salts of (1) traces of moisture; (2) great pressure; (3) heat.

It was found that reaction always took place unless the salts were very carefully dried, and that the reaction was accelerated by shaking the mixture, and by the application of heat or great pressure; further, that the velocity of the reaction is much influenced by the solubility and volatility of the salts.

The effect of small quantities of some other solvents was also tried. It was found that methyl alcohol caused a reaction between lead chloride and potassium iodide in the same way as water, whilst benzene, chloroform, and ammonia were without result.

Finally, it would appear that reaction between solid salts is of essentially the same nature as that between salts in solution, and it is suggested that the water (or other solvent) present forms a film on the surface of the salts, and that in this film minute quantities of the salts dissolve, and there react. In the absence of an ionising solvent there is no chemical reaction, even when the substances are heated or subjected to great pressure.

Physical Society, May 24.—Prof. J. Perry, F.R.S., president, in the chair.—The measurement of mutual inductance by the aid of a vibration galvanometer: A. **Campbell.** Carey Foster's method of comparing a mutual inductance with a capacity is one of the most convenient. The advantage gained by the use of a *vibration galvanometer* in methods for measuring capacity or inductance led the author to apply it to the Carey Foster and the Hughes-Rayleigh methods. He found it was necessary with alternating currents to modify the Carey Foster method by adding a series resistance in the condenser branch; this gave an additional formula involving the ratio of a mutual and a self-inductance. This modification has been suggested by Rowland. The modified method is convenient, the two adjustments required for a balance being independent, and the result not involving a knowledge of the frequency; the use of the vibration galvanometer is an improvement, making the method independent of the wave-form of the current used. The author discussed vibration galvanometers. They belong to the class of tuned instruments. If the detecting instrument used in a null method (with alternating current) is adjusted so that its natural period is in tune with that of the applied voltage, it will be set into strong resonance and will be enormously increased in sensitivity for this particular frequency, practically ignoring in comparison all the other components of the wave-form. Thus in any method in which the tuned instrument is used, a sine wave-form may be assumed. The author exhibited a vibration galvanometer of another type, having a moving coil controlled by an adjustable bifilar suspension. By adjusting the tension of this the tuning is easily effected. For measuring the frequency to which a tuned instrument is responding, it is convenient to use the Hughes-Rayleigh method. The author showed such an arrangement in which the slide-wire was graduated directly in frequency. The author gave results of tests of a standard mutual inductance of 0·05 henry. The Kirchhoff method with direct deflection on a ballistic galvanometer, of measured time of swing, gave a mean of 0·05014 henry, while the Carey Foster method gave 0·05009 henry; the probable error of the latter was much smaller than that of the older method.—Note on the rate of decay of the active deposit from radium: W. **Wilson** and W. **Makower.** In some experiments in which the ionisation produced by the α rays from radium C was balanced against that produced by the more penetrating β and γ rays, it was found that after a short time these two ionisations were no longer exactly equal, however carefully they had been adjusted to equality at first. A similar effect had been noticed by Brousson, and was attributed to the slowly moving β rays emitted by radium B which is present with the radium C. Since these rays are emitted by radium B, whereas the α and more penetrating β rays are emitted by radium C, it is to be expected that the rate of decay as measured by these two types of radiation will be different. The authors' experiments confirm the view that the observed difference in the rate of decay as measured in the two vessels is due to the slowly moving β rays emitted by radium B.—Apparatus for relay working of long submarine telegraph cables: S. G. **Brown.** This relay system consists of three parts:—(1) the actual relaying device or drum relay; (2) an inductive shunt with closed iron circuit for use across the receiving coil to curb the signals and straighten out the zero; and (3) a method of applying a local current possessing suitable time-lag to the receiving coil to correct the tendency of signals made up of two or more impulses of the same polarity to fall away to zero due to the charging up of the receiving condenser itself.

Faraday Society, May 28.—Prof. A. K. Huntington in the chair.—Contributions to the chemistry of gold: F. H. **Campbell.** Aurous iodide, AuI, was prepared and found to decompose at 25°, according to the equation

$$2AuI \rightleftarrows 2Au + I_2.$$

Since this equation contains only one variable, namely, the iodine, there must be a particular pressure of iodine at which AuI, Au, and I_2 are in equilibrium. This was found to be 0·943 of that of pure iodine; any solution of iodine will therefore act on gold if more than 0·943 saturated, but not if below this strength. When gold is acted on by a solution of KI and iodine, part is converted into insoluble AuI and part dissolves. The experimental results with various solutions agree with the equilibrium equations only when the gold is assumed to enter the complex ion in the monovalent condition, *i.e.* to yield AuI_2 ions. The action $3AuCl = AuCl_3 + 2Au$ was found to occur at ordinary temperatures and in absence of moisture.—Reduction of some oxides and sulphides by means of metallic calcium: Dr. F. Mollwo **Perkin.** The author first referred to the well-known powerful reducing action of aluminium, as, for example, its use in the preparation of chromium, ferrosilicon, and other metals and alloys, and its use in the form of "thermite" for welding purposes. He finds that metallic calcium is a still more powerful reducing agent than aluminium. For example, when molecular proportions of aluminium and ferric oxide are mixed together and ignited by means of a fuse of aluminium and barium peroxide, intense reaction ensues, and continues until all the oxygen has been removed from the ferric oxide, and aluminium oxide and metallic iron produced in its stead. When metallic calcium in the form of fine turnings is mixed with ferric oxide and ignited in a similar manner, the reaction is so intense that the mixture is in large part ejected from the crucible. The reaction can be brought under control by mixing 30 per cent. to 40 per cent. of calcium fluoride or 10 per cent. to 20 per cent. of calcium oxide with the contents of the crucible. Boron can be obtained by igniting a mixture of boron trioxide with the calculated quantity of calcium and 5 per cent. to 10 per cent. of calcium oxide. Attention was directed to the difficulty experienced in causing silica in the form of fine sand to react with metallic aluminium which was in the form of a rough powder. A similar difficulty was met with in the case of boric anhydride and aluminium. Galena does not yield metallic lead and calcium sulphide, but a greyish mass which gives off sulphuretted hydrogen when acted upon with acids, lead in the form of a salt being left in solution. Red phosphorus and calcium unite with explosive violence. Sulphur and calcium also react with great vigour.

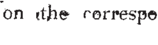
Society of Chemical Industry, June 3.—Mr. R. J. Friswell in the chair.—The nature of the changes involved in the production and setting of plaster of Paris: W. A. **Davis.** The contradictory character of the present knowledge of this problem is first discussed. Data are then adduced to show that the first change occurring in the dehydration of gypsum is the formation of a new, orthorhombic form of the dehydrate, $CaSO_4,2H_2O$, which by loss of water subsequently gives the half hydrate $CaSO_4,2H_2O$ (the essential constituent of ordinary plaster). The so-called "soluble anhydrite" is produced from gypsum, not directly as supposed by van 't Hoff, but as a product of the further dehydration of the half hydrate. The conditions under which this change occurs and the manner in which it may be reversed are dealt with in detail. In the setting of plaster, gypsum is not immediately regenerated, but the second form of the dehydrate referred to above is first produced; it undergoes change into gypsum subsequently.—Analysis of white lead: W. A. **Davis** and C. A. **Klein.** The authors have investigated the sources of error in the different methods used in the analysis of white lead. These errors are much smaller in the case of dry white lead than in that of white lead ground in oil.—Calorimeter for volatile liquid fuels. Specially adapted for petrol: W. Hansen **Rawles.** A development of the Darling calorimeter. The calorimeter, which was made for the author by Messrs. A. Gallenkamp and Co., is applicable to solid and liquid fuels.—The influence of temperature of dyeing on resolution: W. P. **Dreaper** and A. **Wilson.** Basic colours are absorbed by silk fibre in two ways. Above 40° a more permanent absorption of part of the dye takes place which increases up to 100°. A similar effect is noticed with acid dyes on silk. Preliminary boiling with water or acid does not influence subsequent dyeing at low temperatures. A similar result is obtained with direct colours on cotton, so the reaction is a general one. The effect is absent when dyeing in alcohol. Fastness against light does not follow the temperature in same way.—The loss of nitre in the chamber process, part iii.: J. K. H. **Inglis.** The author, in continuation of earlier papers, has again analysed samples of the exit gases from sulphuric acid chambers by means of fractional distillation at low temperatures. Indirect analyses were almost completely avoided, and the results show the presence of small quantities of nitrous oxide and of appreciable quantities of higher oxides, the quantity of nitric oxide being considerable when the sulphur escape is high. There is still a considerable quantity of nitre unaccounted for, its loss being either due to reduction to nitrogen or to the whole of the nitric acid not being collected in this method of analysis.

MANCHESTER.

Literary and Philosophical Society, April 23.—Sir William H. Bailey, president, in the chair.—Coal mines in Sutherlandshire: Dr. M. C. **Stopes.** The mines are of Mesozoic and not of Palæozoic age, as is the case with the vast majority of coal seams.—Science and poetry: C. L. **Barnes.** The author enumerated the principal poems handed down by antiquity, enshrining the scientific knowledge of the age which gave them birth. Among these were the "Phænomena" and "Prognostica" of Aratus, originally written in Greek, but made more familiar in Latin and French translations; Lucretius, "De Rerum Natura"; the "Georgics" and "Bucolics" of Virgil; the "Astronomicon" of Manilius; Marbodus, "De Gemmis"; Alexander Neckam, "De Laudibus Divinæ Sapientiæ"; and Philippe de Thaun, "Le Livre des Créatures." Allusion was also made to the "Canon's Yeoman's Tale," Milton's "Paradise Lost" and "Natura non pati senium"; Cowley's "Plantarum Libri Duo" and "Ode to the Royal Society"; Phineas Fletcher's "Purple Island"; Erasmus Darwin's "Botanic Garden" and "Loves of the Plants"; Rowbotham's "Human Epic," and other poems of less note.

May 7.—Prof. H. B. Dixon, F.R.S., president, in the chair.—A series of photographs illustrating the flora of Corsica, particularly the characteristic bush flora of the mountain slopes: Prof. F. E. **Weiss.** This "macchia" or "Magius" is made up largely of hard-leaved shrubs, such as the arbutus, rock-rose, tree-heath, and shrubby oaks. A comparison with the bush of Table Mountain shows certain similarities between the two floras, both in the manner of growth and in the constituent orders, such as Ericaceæ, &c.—Science and poetry: C. L. **Barnes.** Conclusion of paper read on April 23. Poems were read by Prof. J. C. Maxwell, Prof. Rankine, Archbishop Whately, and others.—The compression of gases by means of hydraulic apparatus: J. E. **Petavel.**

PARIS.

Academy of Sciences, June 10.—M. Henri Becquerel in the chair.—The petrographic constitution of the volcanic *massif* of Vesuvius and Somma: A. **Lacroix.** The petrographic constitution of these rocks has hitherto been considered as extremely simple. It is found, however, that the old volcano is not simply constituted by basic rocks and their projection products. Other rocks are present in abundance, a detailed study of which is given, showing their complex nature.—Observations made at the summit of Mont Blanc from August 31 to September 5, 1906: A. **Hansky** and M. **Stefánik.** Details are given of the atmospheric conditions, attempts at the determination of the rotation of Venus, observations on the sun, Mercury, and Jupiter.—Observations concerning the form of the satellite I. of Jupiter: José Comas **Sola.** The disc of this satellite appears distinctly elongated. This was confirmed by observations made on the night of February 28, when the conditions were exceptionally favourable. The shadows of both satellites I. and II. were seen close together on the planet. The shadow of II. was clearly circular, that of I. being elongated; the flattening is fixed provisionally at $\frac{1}{4}$.—A new Giacobini comet: M. **Giacobini.** This comet was first seen on the night of June 1 at Nice. It is badly defined, 1′·5 to 2′ extent.—A new class of surfaces: G. **Tzitzéica.**—The application of the formulæ relating to molecular volumes to the calculation of the variation of the maximum pressure of water vapour with temperature: A. **Leduc.**—The electric discharge in gases: P. **Villard.**—Some oxidising and decolorising properties of graphite: Henri Louis **Dejust.** A comparison of the decolorising powers of animal charcoal, natural graphite containing 79 per cent. of carbon, and purified graphite containing 93·1 per cent. of carbon, litmus being used as the colouring matter. The activity of the graphite is reduced by purification. Graphite shows an oxidising power analogous to that noted by M. Cazeneuve for animal charcoal.—Modified nickel acetate, a new type of excitor of oxidation for hydroquinone: André **Job.** Pure nickel acetate, heated for a long time at 100° C., loses some acetic acid, but remains completely soluble in cold water. This product acts as an oxydase towards hydroquinone, its activity in this respect being greater than that of manganese acetate. The cause of this remains unknown.—Contribution to the study of the ammonio-mercuric base: H. **Gaudechon.** This base is formed at once by the action of precipitated mercuric oxide upon aqueous ammonia solution, forming hydrates of $(NHg_2)_2O$. The hydrate with one molecule of water is stable at the ordinary temperature in a dry atmosphere, that with four molecules of water stable in a moist atmosphere at 15° C. The hydrate with $5H_2O$ can only exist in the presence of water.—The combinations of hypovanadic acid with some acids containing oxygen: Gustave **Gain.**—The relation between the diagram of the binary alloys and their malleability: Léon **Guillet.**—The mechanism of the synthesis of quinoline derivatives (Döbner's reaction): L. J. **Simon** and Ch. **Manguin.**—The ether function of diphenol, 

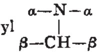
: R. **Delange.**—The action of hydroxylamine on nitriles, amides, and acetylenic esters, and on the corresponding

β-ketonic compounds: Ch. **Moureu** and I. **Lazennec.**—The hydrolysis of salts: A. **Rosenstiehl.** From a consideration of the phenomena of the hydrolysis of esters and salts, the author concludes that the hypothesis of ionisation is unnecessary.—The existence of a tyrosinase in wheaten bran: Gabriel **Bertrand** and M. **Muttermilch.** Wheaten bran is shown to contain at least two ferments, tyrosinase and peroxydiastase.—The basic rocks of the Tschissapa range, northern Ural: L. **Duparc** and F. **Pearce.**—The pleural cavity in the elephant: Guillaume **Vasse.** A fully grown elephant killed in the province of Gorongoza showed on dissection lungs easily detached. There was no point of adherence.—An improved apparatus permitting of staying and working for a long time in irrespirable atmospheres: J. **Tissot.** In a previous note the author has detailed the conditions which should be realised in an apparatus of this kind. The present paper gives an account of an apparatus fulfilling these conditions, together with an account of its actual use in practice.—The digestion of chlorophyll and the stomachic excretion in rotifers: P. **de Beauchamp.**—The hypertensive action of the cortical layer of the supra-renal capsules: O. **Josué** and Louis **Bloch.** The cortical layer has been found to contain substances strongly hypertensive which are chemically different from adrenaline. It is possible that these substances are destined to form adrenaline later, and researches are being carried on to determine this point.—Radioscopy and radiography applied to the inspection of tuberculous meat: H. **Martel.** It is shown that the Röntgen rays may serve to detect tuberculous lesions in meat. The cutting into sections necessitated by the ordinary method of examinations is avoided, thus saving time and preventing the depreciation of the meat. Fat does not interfere.—The geosynclinal Miocene of southern Tell (departments of Algiers and Constantine): J. **Savornin.**—The Dinosauria of the Jurassic in Madagascar: Armand **Trévenin.**—The characteristics of the leaf trace of *Ankyropteris Bibractensis*: Paul **Bertrand.**

DIARY OF SOCIETIES.

THURSDAY, June 20.

Royal Society, at 4.30.—Bakerian Lecture, On the Atomic Weight of Radium: Dr. T. E. Thorpe, C.B., F.R.S.—On the Origin of the Gases Evolved by Mineral Springs: Hon. R. J. Strutt, F.R.S.—On the Presence of Sulphur in Some of the Hotter Stars: Sir J. Norman Lockyer, K.C.B., F.R.S.—The Fluted Spectrum of Titanium Oxide: A. Fowler.—Preliminary Note on a New Method of Measuring Directly Double Refraction in Strained Glass: Dr. L. N. G. Filon.—Studies of the Processes Operative in Solutions, II., The Displacement of Chlorides from Solution by Alcohol and by Hydrogen Chloride, III., The Sucroclastic Action of Nitric Acid as Influenced by Nitrates; IV., The Hydrolysis of Methylic Acetate in Presence of Salts; V., The Discrimination of Hydrates in Solution: Prof. H. E. Armstrong, F.R.S., and others.

Chemical Society, at 8.30.—Some Properties of Radium Emanation: A. T. Cameron and Sir W. Ramsay.—The Affinity Constants of Aminosulphonic Acids as Determined by the Aid of Methyl Orange: V. H. Veley.—Azo-derivatives of 1:3-Diphenylbarbituric Acid. Dynamic Isomerism among the Coloured Hydrazones of 1:3-Diphenylalloxan: M. A. Whiteley.—A Series of Coloured Diazo-salts Derived from p-Aminoaceto-α-naphthalide: G. T. Morgan and W. O. Wootton.—(1) Colour and Constitution of Azo-compounds, Part I.; (2) Colour and Constitution of Azo-compounds, Part II.: J. T. Hewitt and H. V. Mitchell.—The Oxidation of Hydrazines by Free Oxygen: F. D. Chattaway.—Calmatambin, a new Glucoside: F. L. Pyman.—The Decomposition of Hyponitrous Acid in Presence of Mineral Acids: P. C. Rây and A. C. Ganguli.—The Chemical Composition of Petroleum from Borneo: H. O. Jones and H. A. Wootton.—(1) The Synthesis of Phenonaphthacridines. Trimethylphenonaphthacridines; (2) The Condensation of Aldehydes with Mixtures of α-Naphthol and α-Naphthylamine; Synthesis of 7-Aryl  $\begin{array}{c}\alpha\text{—N—}\alpha\\ |\\ \beta\text{—CH—}\beta\end{array}$ Dinaphthacridines: A. Senier and P. C. Austin.—(1) An Improved Form of Apparatus for the Rapid Estimation of Sulphates and Salts of Barium; (2) The Determination of Sugar by Fehling's Solution: W. R. Lang and T. B. Allen.

Linnean Society, at 8.—On the Distribution of Conifers in China and Neighbouring Countries: the late Dr. M. T. Masters, F.R.S.—Lithothamnia of the *Sealark* Expedition: M. Foslie.—The Pre-Glacial Flora of Britain: Clement Reid, F.R.S., and Mrs. Reid.—Report on the Results obtained during the Cruise of the *Silver Belle*: Dr. R. Norris Wolfenden.—On a Small Collection of Amphipoda, and Two New Species: W. M. Tattersall.—On *Pyrosoma spinosum*: G. P. Farran.—Rare or Little-known Fishes taken by the *Silver Belle*: E. W. L. Holt and L. Byrne.—*Sealark* Coccidæ: E. Ernest Green.—Species and Ovicells of Tubucellaria: A. W. Waters.—Doridoeides, a New Genus of Nudibranchs, from the *Sealark*: Sir C. Eliot and T. J. Evans.—Stomatopoda of the *Sealark*: L. A. Borradaile.—On Triassic Species of Zamites and Pterophyllum: E. A. N. Arber.—Introduction to the Voyage of H.M.S. *Sealark*," Part ii.: J. Stanley Gardiner.—Cephalopoda of the Sudan: Dr. W. E. Hoyle.—Descriptions of Plants from Ruwenzori: E. G. Baker, S. Moore, and A. B. Rendle.—The Anatomy of the Julianiaceæ: Dr. E. F. Fritsch.—On Critical Freshwater Algæ: Prof. G. S. West.

TUESDAY, June 25.

Anthropological Institute, at 8.15.—The Kanaka Skull: Dr. D. Waterston.—Instruments employed to obtain Contour Tracings of Different Aspects of the Skull: Prof. D. J. Cunningham, F.R.S.—Notes on Australian Aboriginal Paintings: F. S. Brockman.

Faraday Society, at 8.—The Thermo-chemistry of Electrolysis in Relation to the Hydrate Theory of Ionisation: W. R. Bousfield and Dr. T. Martin Lowry.—The Influence of Non-Electrolytes and Electrolytes in the Solubility of Gases in Water. The Question of Hydrates in Solution: J. C. Philip.—The Dissociation of Hydrates as indicated by their Equilibrium Curves: Dr. A. Findlay.—Hydrates in Solution: Discussion of Methods proposed for determining Degree of Hydration: Dr. George Senter.—The Reading of the Papers will be followed by a General Discussion on "Hydrates in Solution."

Physical Society, at 8.

WEDNESDAY, June 26.

British Astronomical Association, at 5.

THURSDAY, June 27.

Royal Society, at 4.30.—*Probable Papers*: On the Dynamical Theory of Gratings: The Lord Rayleigh, O.M., P.R.S.—On the Surface Tension of Liquids investigated by the Method of Jet Vibration: S. D. Pedersen.—Cases of Colour Blindness, No. VI. to No. XVIII., together with Eleven Selected Examples of Normal Colour Sensations: G. J. Burch, F.R.S.—On the Occurrence of Post-tetanic Tremor in Several Types of Muscles: Dr. D. F. Harris.—On the Pressure of Bile Secretion and the Mechanism of Bile Absorption in Obstruction of the Bile Duct: P. T. Herring and S. Simpson.—Further Studies of Gastrotoxic Serum (Progress Report): Dr. C. Bolton.—And other Papers.

FRIDAY, June 28.

Physical Society, at 5.—Demonstration of the Uses of his Hot Wire Oscillographs and Hot Wire Wattmeters: J. T. Irwin.—(1) A Cosine Flicker Photometer; (2) Some Phenomena in Colour Vision: J. S. Dow.—Description and Exhibition of Students' Apparatus for Measuring Permeability and Hysteresis: Prof. W. E. Ayrton and T. Mather.—Design of Chokers: Prof. W. E. Ayrton and T. Mather.

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